



Pulse Oximetry-facilitated Arterial Cannulation in Pediatric Anesthesia for Cardiac Surgery

**Abdellatif Chlouchi^{a,b*}, Salma Elmanir^{a,c},
Amine Meskine^{a,b}, Azeddine Moujahid^{a,b},
Hatim Elghadbane^{a,b} and Mohamed Drissi^{a,b}**

^a *Department of Anaesthesiology and Intensive Care, Military Teaching Hospital Mohamed V, Rabat, Morocco.*

^b *Faculty of Medicine and Pharmacy of Rabat, Mohammed V University of Rabat, Morocco.*

^c *Department of cardiac surgery, Military Teaching Hospital Mohamed V, Rabat, Morocco.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Invasive blood pressure monitoring is required in cardiac surgery for several reasons. Arterial cannulation in pediatrics is a daily challenge for anesthesiologists. Localization of the artery before catheterization is usually done by palpation or guided by ultrasounds. These two techniques are not always efficient and sometimes generate complications and a considerable loss of time. Through this clinical case, we describe a simple and innovative technique inspired by our daily practice allowing locating the artery with the help of pulse oximetry.

*Corresponding author: E-mail: drchlouchi.rea@gmail.com;

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1. INTRODUCTION

Invasive blood pressure monitoring is required in cardiac surgery for three reasons: Continuous monitoring of systemic hemodynamics, blood pressure in extracorporeal circulation and easing blood sampling: blood gases, blood glucose levels... [1].

Arterial cannulation in pediatrics is a daily challenge for anesthesiologists, especially in cardiac surgery. Accurate localization of the small artery is technically difficult, particularly in small children and infants. This situation may be further complicated by dehydration or hemodynamic instability [2].

Localization of the artery before catheterization is usually done by palpation or guided by ultrasounds. These two techniques are not always efficient and sometimes generate complications and a considerable loss of time [3-4].

Through this clinical case, we describe a simple and innovative technique inspired by our daily practice allowing locating the artery with the help of pulse oximetry.

2. CLINICAL CASE

This is a 05 months old female infant followed for trisomy 21, with a cardiac murmur on an inter-ventricular communication. She weighs 4 kg. She is admitted this day in the operating room for surgical cure under extracorporeal circulation.

After monitoring, the patient was sedated with 3% Sevoflurane. We took a 24 G left radial peripheral venous line. The parameters after induction and intubation were as follows: SPO₂=100%, NIBP= 105/35 mmhg and HR=130 bpm.

To cannulate the left femoral artery, palpation of the femoral pulse was too difficult and ultrasounds provided a poor view of the artery. The same problem was found on the right side.

We placed the pulse oximetry on the left big toe; the plethysmography curve appears well oscillated on the monitor (Fig. 1).



Fig. 1. Plethysmography curve before compression

The delicate compression at the level of the inguinal line makes the oscillations of the plethysmography curve disappear and allows us to locate precisely the artery. We successfully catheterized the artery on the first attempt. (Figs. 2,3).



Fig. 2. Compression on the inguinal line

The catheter has been securely attached and connected to the signal transducer and we obtain an invasive blood pressure curve on the monitor after purging the tubing and setting the zero.

We also placed a right central jugular line with ultrasounds before allowing the surgical team to complete the management.



Fig. 3. Loose of the plethysmography curve after compression

Postoperatively, the patient was transferred to the cardiovascular intensive care unit. She was extubated after 24 hours and transferred to the department on the third day after removal of the arterial and central line.

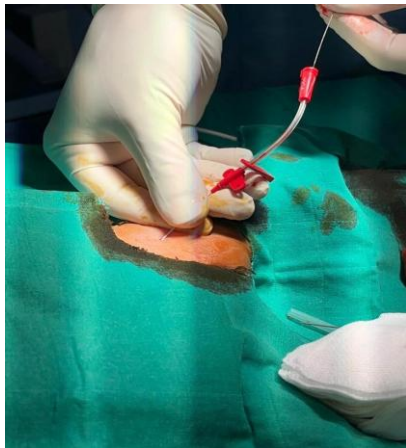


Fig. 4. Left femoral artery catheter in place

3. DISCUSSION AND CONCLUSION

This arterial compression technique has been described to perform an Allen test before radial artery puncture in a sleeping patient [5]. For arterial cannulation, it can be more ergonomic and provides excellent maneuverability, allowing the operator to make finer movements and improving his own comfort.

Ultrasound increases also the success rate of cannulation at the first attempt and reduces hematoma formation. It increases the success rate of the second attempt as well. It is probably more useful for infants and young children than for older children, especially if the practitioner is experienced [6].

Improved arterial cannulation techniques may decrease the number of attempts allowing

considerable time savings and avoidance of complications namely distal ischemia, tissue necrosis and local infection [7].

Further studies are needed to investigate the efficacy and risks of this technique. In our center, we have started a prospective study whose aim is to compare this technique with ultrasounds in terms of efficacy and time saving and the first results are encouraging.

PATIENT CONSENT

We have obtained the father's consent for the publication of this case.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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